

### **3.1.**

## **AMBIENT BIOLOGICAL MONITORING**

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As part of the SWAT program, the Biological Monitoring Section evaluates benthic macroinvertebrate communities of Maine streams and rivers to see if they are impaired by toxic contamination. Benthic macroinvertebrates are animals without backbones that can be seen with the naked eye and live on the stream bottom, such as mayflies, stoneflies, caddisflies, crayfish, snails, and leeches. In 2004, we evaluated the condition of 39 sample locations, primarily in the Saint John River basin.

Table 3.1.1 summarizes the results of biological monitoring activities for the 2004 SWAT Program, sorted by waterbody name. Column headings of Table 3.1.1 are described below:

- *Station* – Since waterbodies are sometimes sampled in more than one location, each sampling location is assigned a unique “Station” number.
- *Log* – Each sample event is assigned a unique “Log” number.
- *Map* – The “Map” number refers to Maps 1 through 24, which are located after the tables.
- *Location* – Some Stations are located upstream or downstream of potential sources of pollution, which are called “Issues”.
- *Issue* – Issues are potential sources of pollution.
- *Statutory Class* – The state legislature has assigned a statutory class, either AA, A, B, or C, to every Maine stream and river. Class AA and A waterbodies shall support a “natural” biological community. Class B waterbodies shall not display “detrimental changes in the resident biological community”. Class C waterbodies shall “maintain the structure and function of the resident biological community”.
- *Model Class* – The Biological Monitoring Unit uses a multivariate statistical model, called BioME, to analyze a benthic macroinvertebrate sample and predict if a waterbody is attaining the biological criteria associated with its statutory class. The Model Class is the final determination of the BioME model. If a stream does not meet minimum state criteria, Class C, then the Model Class is non-attainment (NA). AA and A are treated the same in the model.
- *Attains Class* – “Y” is given if the Model Class is equal to or exceeds the Statutory Class. A Class B stream, for example, would receive a “Y” if its Model Class was either A or B. “N” is given if a stream does not attain its Statutory Class. A Class B stream, for example, would receive an “N” if its Model Class was either C or NA. A dash (“-”) is given if the sample was disturbed or provided insufficient information.
- *Probable Cause* – The probable cause column lists potential stressors to benthic macroinvertebrate communities, based on best professional judgement. In some cases, a probable cause may not be related to toxic pollution but instead to poor habitat conditions.

Data reports for each sampling event (Aquatic Life Classification Attainment Reports) are available in electronic format with the web version of this report. Supporting water chemistry data are given in Table 3.1.2. Water temperature data are given in Figure 3.1.1. For more information about the Biological Monitoring Unit, please e-mail us at [biome@maine.gov](mailto:biome@maine.gov) or visit our web site: <http://www.state.me.us/dep/blwq/docmonitoring/biomonitoring/index.htm>.

## **Results Summary**

- Thirty-nine stations were assessed for the condition of the benthic macroinvertebrate community.
- Fourteen of the thirty-nine stations (36 %) reported failed to attain the aquatic life standards of their assigned class.
- Seventeen of the thirty-nine stations (44 %) exhibited natural aquatic communities (Class A).
- One sample was run through the BioME model and resulted in an indeterminate outcome for class attainment, and one sample had insufficient data to run through the model.

## **Historical Notes**

(not all of the samples listed below were collected under the SWAT Program)

- Androscoggin River (Station 244) attained class in 2000 and 2003. It failed to attain class in 1995 and 2002.
- Aroostook River (Station 118) attained class in 1987.
- Birch Stream (Station 312) failed to attain class in 1997, 1999, 2001, and 2003.
- Birch Stream (Station 682) failed to attain class in 2003.
- Caribou Stream (Station 96) attained class in 1985, 1991, and 1999 (exceeded class in 1985 and 1999).
- Kennebec River (Station 24) attained class in 1983, and failed to attain class in 2002.
- Kennebec River (Station 195) attained class in 1992.
- Kennedy Brook (Station 620, Augusta) attained class in 2002.
- Kennedy Brook (Station 644, Presque Isle) attained (exceeded) class in 2002.
- Kennedy Brook (Station 646, Presque Isle) attained class in 2002.
- Limestone Stream (Station 47) attained class in 1983.
- N. Br. Presque Isle Stream (Station 11) attained class in 1983 and 1994.
- Prestile Stream (Station 4) attained class in 1983, and failed to attain class in 1999.
- Pretty Brook (Station 458) failed to attain class in 1999.
- Rocky Brook (Station 375) attained class in 1999.
- Sheepscot River (Station 74) attained class in 1987, 1989, 1990, 1992, 1995, 1996, 1998, 1999, 2000, 2001, 2002, and 2003. It failed to attain class in 1984, 1985, 1986, 1988, 1991, 1993, 1994, and 1997.
- Trout Brook (Station 302) attained class in 1999 and failed to attain class in 1997, 2000, and 2003.
- Trout Brook (Station 675) failed to attain class in 2003.
- West Branch Sheepscot River (Station 268) attained class in 1995, 1996, 1997, 1998, 1999, 2001, and 2002. It failed to attain class in 2000 and 2003.

**TABLE 3.1.1 - 2004 SWAT Benthic Macroinvertebrate Biomonitoring Results**

Name	Map	Station	Log	Town	Location	Issue <sup>1</sup>	Statutory Class/ Model Class	Attains Class?	Probable Cause <sup>1</sup>
Androscoggin River	1	244	1410	Livermore Falls	downstream	Industrial	C / B	Y	
Aroostook River	2	118	1391	Masardis		Reference	AA / A	Y	
Big Brook	3	728	1389	Madawaska		Agric NPS	B / A	Y	
Birch Stream	4	312	1401	Bangor	downstream	Urban NPS; Airport	B / NA	N	NPS Toxics; Habitat
Birch Stream	4	682	1402	Bangor	downstream	Urban NPS; Airport	B / C	N	NPS Toxics; Habitat
Caribou Stream	5	96	1387	Caribou		Urban NPS	B / A	Y	
Clarke Brook ("Unnamed")	6	726	1392	Ashland		NPS	B / A	Y	
Coloney Brook	7	733	1381	Ft. Fairfield		Agric NPS	B / A	Y	
Gardner Brook	8	689	1385	Wade		Reference	B / A	Y	
Goodall Brook	9	747	1371	Sanford	upstream	Urban NPS	B / NA	N	NPS Toxics; Habitat
Goodall Brook	9	748	1372	Sanford	downstream	Urban NPS	B / A	Y	
Kennebec River	10	24	1408	Fairfield	downstream	Industrial	C / C	Y	
Kennebec River	11	195	1409	Skowhegan	upstream	Control	B / B	Y	
Kennedy Brook	12	620	1366	Augusta		Urban NPS	B / NA	N	NPS Toxics
Kennedy Brook	13	644	1377	Presque Isle		Urban NPS	B / B	Y	
Kennedy Brook	13	646	1378	Presque Isle		Urban NPS	B / A	Y	
Limestone Stream	7	47	1383	Limestone	downstream	Municipal	C / B	Y	
Limestone Stream	7	732	1384	Limestone	upstream	Control	C / B	Y	
Little Machias River	14	754	1390	Nashville Plt		NPS	A / A	Y	
Little Madawaska River	15	731	1382	Caribou	downstream	Municipal/ NPS	B / B	Y	Resample (high water)
Long Creek (south branch)	16	753	1398	So. Portland		Urban NPS	C / NA	N	NPS Toxics; Habitat
Long Creek	16	752	1399	So. Portland		Urban NPS	C / NA	N	
Martin Stream	17	756	1403	Dixmont	downstream	Agric NPS	A / I	-	Resample
Martin Stream	17	755	1404	Dixmont	upstream	Agric NPS	A / B	N	
Merrit Brook	13	742	1379	Presque Isle		NPS	B / I	-	Resample

<sup>1</sup> NPS = non-point source pollution

**TABLE 3.2.1 - 2004 SWAT Benthic Macroinvertebrate Biomonitoring Results (cont.)**

Name	Map	Station	Log	Town	Location	Issue <sup>1</sup>	Statutory Class/ Model Class	Attains Class?	Probable Cause <sup>1</sup>
N. Br. Presque Isle Stream	18	11	1386	Mapleton		Former Point Source	B / A	Y	
Prestile Stream	6	4	1375	Easton		Agric NPS	A / C	N	Excess Nutrients
Prestile Stream	6	690	1376	Westfield		Agric NPS	A / B	N	
Pretty Brook	19	458	1393	Mars Hill		Agric NPS	B / A	Y	
Rocky Brook	19	375	1374	Mars Hill		Agric NPS	B / A	Y	
Royal River	20	760	1415	Gray	upstream	Control	A / A	Y	
Royal River	20	761	1416	Gray	downstream	Creosote Spill	A / A	Y	
Sheepscot River	21	74	1364	N. Whitefield		Reference	AA / A	Y	
Sucker Brook	4	624	1400	Hampden		Urban/Agric NPS	B / C	N	NPS Toxics; Habitat
Trout Brook	22	302	1396	So. Portland	downstream	Urban NPS	C / NA	N	NPS Toxics
Trout Brook	22	675	1397	So. Portland	upstream	Urban NPS	C / NA	N	NPS Toxics
Violette Brook	23	729	1388	Van Buren		Urban NPS	B / A	Y	
W. Br. Sheepscot River	24	268	1365	China		Reference	AA / B	N	
Whitney Brook	19	749	1373	Bridgewater		Agric NPS	B / A	Y	

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<sup>1</sup> NPS = non-point source pollution

**TABLE 3.1.2 - 2004 SWAT Nutrients and Solids Data**

Log	Waterbody	Sampling Date	DOC	NH <sub>4</sub> -N	TKN	NO <sub>2</sub> -NO <sub>3</sub> -N	OPO <sub>4</sub>	Total P	TSS	TDS
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1402	Birch Stream	8/24	3.3	<0.01	0.3	0.49	0.005	0.022	2	270
1401	Birch Stream	8/24	3.3	<0.01	0.3	0.49	0.004	0.020	~0.9	270
1366	Kennedy Brook	8/10	1.6	0.01	0.2	0.93	0.007	0.011	~0.2	300
1364	Sheepscot River	8/10	6.5	0.01	0.4	0.01	0.001	0.013	~0.6	47
1365	W. Br. Sheepscot River	8/10	6.3	<0.01	0.4	0.02	0.001	0.011	~0.4	44

DOC = dissolved organic carbon, NH<sub>4</sub>-N = ammonia-nitrogen, TKN = Total Kjeldahl Nitrogen, NO<sub>2</sub>-NO<sub>3</sub>-N = nitrite-nitrate-nitrogen, OPO<sub>4</sub> = Ortho-phosphate, Total P = total phosphorus, TSS = total suspended solids, and TDS = total dissolved solids; ND = not detected down to reporting limit.